

REMARKS

The Office Action dated March 25, 2004, has been received and reviewed.

Claims 38-43 and 45-69 are currently pending and under consideration in the above-referenced application, each standing rejected.

Reconsideration of the above-referenced application is respectfully requested.

Claim Amendments

Each of claims 38-43 and 45-69 has been amended to replace each occurrence of the term "said" with "the." As these are equivalent terms, the amendments to claims 38-43 and 45-69 do not change the scope of any of these claims.

Independent claim 60 has also been amended. The amendment of independent claim 60 is discussed in further detail hereinafter.

None of the claim amendments introduces new matter into the above-referenced application.

Information Disclosure Statement

Please note that a Supplemental Information Disclosure Statement was filed in the above-referenced application on December 3, 2003, but that the undersigned attorney has not yet received any indication that the references listed on pages 2 and 3 of the Form PTO/SB/08A that accompanied that Supplemental Information Disclosure Statement have been considered.

Copies of the Supplemental Information Disclosure Statement of December 3, 2003, its accompanying Form PTO/SB/08A, and a U.S.P.T.O. date-stamped postcard evidencing receipt of the same by the Office are enclosed for the sake of convenience.

It is respectfully requested that the references cited in the Supplemental Information Disclosure Statement of December 3, 2003, be considered and made of record in the above-referenced application and that initialed copies of pages 2 and 3 of the corresponding Form PTO/SB/08A be returned to the undersigned attorney as evidence of such consideration.

Rejections Under 35 U.S.C. § 112, First Paragraph

Claim 38 stands rejected under 35 U.S.C. § 112, first paragraph, for reciting subject matter which was allegedly not adequately described in the specification of the above-referenced application.

Specifically, the Office has asserted that the specification of the above-referenced application does not provide support for the recitation in claim 38 of at least on stabilizer that includes a plurality of layers of the same material.

It is respectfully submitted that page 24, line 18, to page 25, line 15 and Figs. 17 and 18 provide support for this recitation in claim 38. In particular, these parts of the disclosure of the above-referenced application describe an exemplary process for fabricating stabilizers. More specifically, page 24, line 18, to page 25, line 15, of the specification explains that stereolithography processes may be used to form stabilizers from multiple layers of at least partially cured photopolymer (*i.e.*, the same material).

As the specification of the above-referenced application provides clear support for the recitation in claim 38 of at least one stabilizer that includes “a plurality of . . . layer of the same material,” it is respectfully submitted that claim 38 complies with the requirements of the first paragraph of 35 U.S.C. § 112.

Accordingly, withdrawal of the 35 U.S.C. § 112, first paragraph, rejection of claim 38 is respectfully requested.

Claims 38 through 43, and 45 through 69 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Applicant’s admitted prior art in combination with Hashimoto (U.S. Patent No. 6,410,366) and Sasaki et al. (Japan Patent No. JP402210329A). Applicant respectfully traverses this rejection, as hereinafter set forth.

Rejections Under 35 U.S.C. § 103(a)

Each of claims 38-43 and 45-69 stands rejected under 35 U.S.C. § 103(a) for being directed to subject matter which is allegedly unpatentable over purportedly admitted prior art

(hereinafter “APA”), in view of teachings from U.S. Patent 6,410,366 to Hashimoto (hereinafter “Hashimoto”) and, further, in view of the subject matter taught in Japanese patent publication JP 402210329A of Sasaki et al. (hereinafter “Sasaki”)..

M.P.E.P. § 706.02(j) sets forth the standard for a rejection under 35 U.S.C. § 103(a):

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant’s disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The Office asserts that the above-referenced application admits that, prior to the filing date of the above-referenced application, it was known in the art to disposed semiconductor dice with centrally aligned bond pads on substrates in a flip-chip fashion.

Hashimoto also teaches use of flip-chip connection techniques to secure semiconductor dice with centrally aligned bond pads to larger scale substrates. More specifically, Hashimoto teaches forming bumps 11 on the active surface of a semiconductor die 10 which has bond pads 12 that are arranged along a straight line L. FIG. 1A; col. 5, lines 24-58.

The bumps 11 on the semiconductor die 10 are positioned so as to align with corresponding bumps 21 of a substrate 20 as the semiconductor die 10 is positioned face-down (*i.e.*, in a flip-chip fashion) over the substrate 20. FIG. 1B; col. 6, line 60, to col. 7, line 17. When positioned against each other, a bump 11 of the semiconductor die 10 and a corresponding bump 21 of the substrate 20 form a support. FIG. 1B; col. 7, lines 18-33.

Hashimoto also teaches that, following the positioning of a semiconductor die 10 over a substrate 20, an anisotropic conductive material 40 may be disposed therebetween and cured, permanently securing the semiconductor die 10 and substrate 20 to one another. Col. 7, line 39, to col. 8, line 7. As the type of bonding taught in Hashimoto is permanent, rather than the temporary electrical connections (typically under a biasing load) that are made when a

semiconductor die is oriented over a test substrate, it is readily apparent that Hashimoto does not teach or suggest that the substrate 20 thereof may comprise a test substrate.

Sasaki teaches single-layered spacers that are formed from photopolymer.

Independent claim 38 recites a semiconductor device that includes a substrate and at least one stabilizer. The substrate of independent claim 38 includes contact pads that are exposed at a surface thereof. The contact pads are arranged in at least one substantially linear relationship positioned at or proximate a centerline of the substrate. The contact pads are configured to communicate with corresponding test pads of a test substrate upon disposing said substrate face-down over said test substrate. The at least one stabilizer of the semiconductor device of independent claim 38 protrudes from the surface of the substrate and is configured to at least partially stabilize an orientation of the semiconductor device upon disposal thereof face-down over the test substrate. In addition, the at least one stabilizer of independent claim 38 includes a plurality of superimposed, contiguous, mutually adhered layers of the same material.

It is respectfully submitted that a *prima facie* case of obviousness has not been established against independent claim 38 because none of the APA, Hashimoto, or Sasaki includes any teaching or suggestion of a stabilizer that includes a plurality of at least partially superimposed, contiguous, mutually adhered layers of the same material. Rather, the APA lacks any teaching or suggestion of stabilizers, while the bumps 11 of Hashimoto and the support islands 16 of Sasaki are single-layer structures.

Even assuming, for the sake of argument, that two corresponding bumps 11 and 21 of Hashimoto could be considered to form a single stabilizer that includes two layers, Hashimoto does not teach or suggest that bumps 11 and bumps 21 are necessarily “mutually adhered” or otherwise secured to one another, as would be required to anticipate independent claim 38.

Accordingly, it is respectfully submitted that the purported APA, Hashimoto, and Sasaki do not support a *prima facie* case of obviousness against the subject matter recited in independent claim 38. It is, therefore, respectfully submitted that, under 35 U.S.C. § 103(a),

amended independent claim 38 is directed to subject matter which is allowable over that taught in the purported APA, Hashimoto, and Sasaki.

Each of claims 39-43 and 45-52 is allowable, among other reasons, for depending either directly or indirectly from claim 38, which is allowable.

Claim 48 is also allowable since none of the purported APA, Hashimoto, or Sasaki teaches or suggests a stabilizer which is elongated in a direction parallel to a plane in which the substrate is located. Rather, the purported APA lacks any teaching or suggestion of a stabilizer, while the teachings of Hashimoto are directed to small, discrete stabilizers, or bumps 11 and 21, and the teachings of Sasaki are directed to "island" spacers, which are also apparently very small, discrete elements that maintain uniform separation the electrodes of a field emission display.

Claim 49 is additionally allowable because none of the purported APA, Hashimoto, or Sasaki includes any teaching or suggestion of a semiconductor device which includes a semiconductor wafer with stabilizers protruding from a surface thereof. Instead the teachings of Hashimoto are limited to singulated semiconductor dice 10 with bumps 11 protruding therefrom, while the island spacers 16 of Sasaki protrude from a grid electrode of a field emission array.

Claim 51 is further allowable since the APA, Hashimoto, and Sasaki all lack any teaching or suggestion of a semiconductor device that comprises a chip-scale package with at least one stabilizer protruding from a surface thereof. Rather, the teachings of Hashimoto are limited to bare semiconductor dice 10 with bumps 11 protruding therefrom, while the island spacers 16 of Sasaki protrude from the grid electrode of a field emission array.

Independent claim 53 is drawn to a test substrate that includes a substrate and at least one stabilizer protruding from a surface of the substrate. The substrate includes test pads, which are exposed at a surface thereof and are arranged in at least one substantially linear relationship. The test pads are also configured to communicate with corresponding contact pads of a semiconductor device which is to be disposed face-down over the substrate. The at least one stabilizer is configured to at least partially stabilize the semiconductor device upon disposal thereof face-down over the test substrate.

It is respectfully submitted that the purported APA, the teachings of Hashimoto, and the teachings of Sasaki, taken collectively or individually, do not support a *prima facie* case of obviousness against independent claim 53 or any of claims 54-59 depending therefrom.

First, it is respectfully submitted that one of ordinary skill in the art would not have been motivated to modify the teachings of Hashimoto in the manner that has been asserted; to replace the permanent carrier substrate 20 thereof with a test substrate. Specifically, Hashimoto lacks any teaching or suggestion that corresponding bumps 11 and 21 are secured to one another. Therefore, in order for the bumps 11 and 21 of Hashimoto to stabilize a semiconductor die 10, the semiconductor die 10 must be secured and permanently electrically connected to a substrate 20. *See, e.g.*, col. 7, line 41, to col. 8, line 7.

In contrast, it is well known in the art that semiconductor dice are not permanently electrically connected to test substrates, such as that recited in independent claim 53. Instead, clamps or other structures are often used with test substrates to establish temporary electrical connections between the bond pads of a semiconductor device and the test contacts of a test substrate.

Second, it is respectfully submitted that none of the purported APA, Hashimoto, or Sasaki teaches or suggests a test substrate of the type recited in independent claim 53. Instead, the teachings of Hashimoto are limited to a carrier substrate that includes stabilizing bumps 21 thereon. This is evident from Hashimoto's teaching that the substrate 20 is configured to have a semiconductor die 10 permanently secured thereto (*e.g.*, by way of anisotropically conductive material 40 – col. 7, line 41, to col. 8, line 7), rather than temporarily secured thereto, as would be the case if substrate 20 were a test substrate. Accordingly, it is respectfully submitted that Hashimoto does not teach or suggest each and every element of independent claim 53.

Each of claims 54-59 is allowable, among other reasons, for depending either directly or indirectly from claim 53, which is allowable.

Claim 58 is additionally allowable because none of the purported APA, Hashimoto, or Sasaki teaches or suggests at least one stabilizer that comprises “a plurality of . . . mutually adhered layers.” In this regard, the purported APA lacks any teaching or suggestion of spacers, while Hashimoto neither teaches nor suggests that bumps 11 and 21 may be adhered or otherwise

secured to one another, and the island spacers 16 of Sasaki apparently include on a single material layer.

Independent claim 60 recites an assembly of a semiconductor device and a test substrate. The test substrate of the assembly includes a plurality of test pads exposed at a surface thereof and arranged in at least one substantially linear relationship. The semiconductor device of the assembly includes a plurality of contact pads exposed at a surface thereof and arranged in at least one substantially linear relationship which is located at or proximate a centerline of the semiconductor device. The contact pad-bearing surface of the semiconductor device faces the test pad-bearing surface of the test substrate. As amended and presented herein, independent claim 60 recites that corresponding contact pads and test pads are in *temporary* communication with one another. In addition, at least one stabilizer is disposed the test substrate and the semiconductor device.

Again, the substrate 20 that is taught in Hashimoto is not a test substrate, as recited in independent claim 60. Rather, it is carrier substrate, which is a very different type of component from a test substrate. Further, the teachings of Hashimoto are limited to permanently securing bond pads (*i.e.*, electrodes 12) of a semiconductor die 10 to corresponding terminals (*i.e.*, interconnect pattern 22) of a substrate (col. 7, line 41, to col. 8, line 7), as opposed to the *temporary* communication recited in independent claim 60.

In view of the differences between the permanent carrier substrates taught in Hashimoto and the test substrates that were purportedly in the prior art, it is respectfully submitted that one of ordinary skill in the art would not have been motivated to substitute the test substrate of the purported APA for the carrier substrate of Hashimoto. Rather, it appears that any such motivation could only have been improperly derived from the disclosure provided by the above-referenced application.

Sasaki provides no teaching or suggestion that would remedy this deficiency.

Claims 61-69 are each allowable, among other reasons, for depending from claim 60, which is allowable.

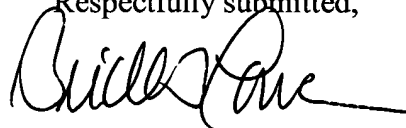
Claim 66 is further allowable since none of the purported APA, Hashimoto, or Sasaki teaches or suggests at least one stabilizer that comprises "a plurality of . . . mutually adhered layers." In this regard, the purported APA lacks any teaching or suggestion of spacers, while Hashimoto neither teaches nor suggests that bumps 11 and 21 may be adhered or otherwise secured to one another, and the island spacers 16 of Sasaki apparently include on a single material layer.

In view of the foregoing, withdrawal of the 35 U.S.C. § 103(a) rejections of claims 38-43 and 45-69 is respectfully requested.

CONCLUSION

It is respectfully submitted that each of claims 38-43 and 45-69 is allowable. An early notice of the allowability of each of these claims is respectfully solicited, as is an indication that the above-referenced application has been passed for issuance. If any issues preventing allowance of the above-referenced application remain which might be resolved by way of a telephone conference, the Office is kindly invited to contact the undersigned attorney.

Respectfully submitted,



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